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**United States Patent** [19]

Carney et al.

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- [54] **TRANSCIEVER APPARATUS EMPLOYING WIDEBAND FFT CHANNELIZER WITH OUTPUT SAMPLE TIMING ADJUSTMENT AND INVERSE FFT COMBINER FOR MULTICHANNEL COMMUNICATION NETWORK**
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- [52] U.S. Cl. .... **375/219; 375/232; 375/233; 375/260; 370/29; 370/23; 370/70**
- [58] **Field of Search** ..... **375/229-233, 375/219, 259, 260; 370/18, 29, 23, 58.1, 123, 70, 97**
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*Primary Examiner*—Stephen Chin*Assistant Examiner*—Don Vo**[57] ABSTRACT**

A physically compact, multichannel wireless communication transceiver architecture employs overlap and add or polyphase signal processing functionality, for wideband signal processing, together with a sample rate. A receiver section receives a plurality of multiple frequency communication channels and outputs digital signals representative of the contents of the plurality of multiple frequency communication channels. The receiver section contains an FFT-based channelizer that processes the digital signals output by a wideband digital receiver and couples respective channel outputs to a first plurality of digital signal processor units, which process (e.g. demodulate) respective ones of the digital channel signals and supply processed ones of the digital channel signals at respective output ports for distribution to an attendant voice/data network. On the transmit side, a transmit section contains a plurality of digital signal processors, respectively associated with respective ones of a plurality of incoming (voice/data) communication signals to be transmitted over respectively different frequency channels. Their processed (modulated, encoded) outputs are supplied to an inverse FFT combiner. The FFT combiner supplies a combined multichannel signal to a wideband transmitter which transmits a multiple frequency communication channel signal. Each of the channelizer and combiner may be implemented using overlap and add or polyphase filtering.

**67 Claims, 29 Drawing Sheets**